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Urban Biodiversity: Successes and Challenges: Clydebank as a hotspot for the common pill woodlouse *Armadillidium vulgare*

Glyn M. Collis

'Seasgair', Aseog, Isle of Bute, PA20 9ET

E-mail: g.m.collis@gmail.com

ABSTRACT

In Scotland, the common pill woodlouse is at the Northern edge of its range. On the east coast it extends as far north as Johnshaven. Until a recent discovery in Helensburgh, the northernmost location in the west was Clydebank, where two sites were discovered by Futter (1998). An additional four sites have since been discovered, which is an unusual degree of clustering. Five of the six Clydebank sites are alongside railways. Consideration is given to factors permitting the species to arrive, survive and thrive in railway-side sites, and in Clydebank.

THE COMMON PILL WOODLOUSE IN SCOTLAND

The common pill woodlouse *Armadillidium vulgare* is the most widespread of seven native British species in the family Armadillidae, hence the addition of "common" to its traditional vernacular name. It is one of the most common of all woodlouse species in southern Britain, but in Scotland it is more sparsely distributed and at the edge of its range. The nature of its Scottish distribution has become more clear as recording coverage has improved. The first published atlas of woodlice in Britain and Ireland (Harding & Sutton, 1985) showed three groupings of records: on the east coast as far north as Tayside; on the Solway coast; and inland among horticultural nursery sites in the Clyde valley between Rutherglen and Lesmahagow (Harding, Collis & Collis, 1980). There was just one west coast record, from Troon Station by J. Naden in 1976.

By the time data were compiled for a new atlas (Gregory, 2009), increased recording effort had resulted in a good number of additional records, including some published in *The Glasgow Naturalist* (Stirling, 1995; Futter, 1998) and records from a field meeting of the British Myriapod

and Isopod Group in Ayrshire in 2006 (Collis, 2007), plus a number of additional records by the author.

Comparison of the two atlases makes it clear that the difference in numbers of records between the east and west coasts in Harding and Sutton's atlas was partly an artefact of recording effort. However, the tendency for the species to extend further north in the east than in the west seems likely to be real, with a 2005 record from as far north as Johnshaven in the east (Davidson, 2010). In the west, the northernmost locations shown in the 2009 atlas were Futter's (1998) two sites in Clydebank, though in May 2009 the author found a site a little further north in Helensburgh, NS303820, at the shore end of a footpath from East Clyde Street.

Gregory's 2009 atlas also confirms that, in Scotland, the distribution of the pill woodlouse is predominantly coastal. Many of the coastal sites are on, or very close to the shoreline, which might be considered its primary natural habitat in most of Scotland. However, care is needed in this respect. The record from Johnshaven was among builders rubble deposited above a shingle beach (Davidson, 2010). The Helensburgh shoreline site could equally well be regarded as a suburban site with a high potential for the introduction of small invertebrates among rubble, garden waste, etc., dumped on the shoreline. There is a strikingly similar suburban shoreline site at Boathouse Road, Largs, NS197607. A site at Fairlie, NS207541 could also be classified as suburban shoreline, but with the further complication of a nearby wholly artificial coastline constructed in the 1970s for the Hunterston deep-water ore and coal terminal. A railway line followed the artificial coastline to service a now-dismantled iron ore reduction plant. Much of the material for the construction project was obtained locally, from Biglees Quarry and Campbeltown Farm (<http://www.hunterston.eu/oreterminal>), but doubtless other materials were brought in from further afield.

CLYDEBANK SITES

The first records of the pill woodlouse in Clydebank were by Futter (1988). In the period 1995-1997, she located specimens in a suburban garden in Parkhall Road, NS488718, and around a disused band hall on Second Avenue, NS495710. I visited these two locations in June 2007 and found the species in large numbers (>100) around the band hall and also beside the church close-by on Second Avenue. On Parkhall Road, instead of searching gardens, I found the species in small numbers in public shrubbery areas at NS489718 - close to Futter's location.

Two features of the band hall site are that it is immediately adjacent to a railway line and, like much of Clydebank, it is on a south facing slope. The pill woodlouse is believed to favour sunny locations; unusually for woodlice it is sometimes found in full sunlight (Gregory, 2009). The band hall is in a very sunny location, elevated above the railway line on the other side of which the land falls away sharply to the south. Having found pill woodlice associated with railways in England and Wales, and mindful of Cawley's

(1996) observations in Ireland, as and when opportunities arose I searched railway-side sites elsewhere in Clydebank. Non-railway habitats were not searched so thoroughly.



Fig. 1. Sketch map of Clydebank sites for the common pill woodlouse: 1 Parkhall Road, NS488718; 2 Second Avenue (derelict band hall) NS495710; 3 Argyle Road railway bridge, NS501705; 4 John Knox Street NS504694; 5 Cable Depot Road (abandoned docks line) NS490705; 6 Clydebank Public Park/Dalmuir Station NS484714.

In May 2008 I found the species among rubbish at the base of railings separating railway land from mown grass at the north-east corner of Argyle Road railway bridge, NS501705. Like the band hall site, this is on the Singer line. Subsequently, I discovered a site on the Yoker line (NS504694, November 2009), among rubble at the base of a brick wall separating railway land from the site of a demolished building, accessible from John Knox Street.

The Yoker and Singer lines converge at Dalmuir Station. Here too I found pill woodlice among rubble at the base of the railway-side fence where it is accessible from the southern corner of Clydebank Public Park (NS484714, June 2010). In the park, I also found it a short distance away from the railway, where the Park borders the western end of Regent Street (NS484715). I was unable to find this species in a search of the glasshouses and their immediate surroundings at the western-most corner of the Park (NS480716), even though glasshouses and horticultural areas are often favoured by the species. Its absence there cannot easily be explained by an overuse of pesticides since I easily found the woodlice *Oniscis asellus*, *Philoscia muscorum*, *Porcellio scaber*, *Porcellio spinicornis* and *Trichoniscus pusillus* agg. at this location. Of course, pill woodlice may yet be found there.

In addition to the Singer and Yoker branches of the railway network through Clydebank, there are also the remains of branch lines to the docks. I found pill woodlice at the foot of the embankment of one such disused line (NS490705, June 2010), accessed from an abandoned industrial site on Cable Depot Road.

Conservatively, if we consider the two closely adjacent sites in Clydebank Public Park (Dalmuir Station and end of Regent Street) as one, and similarly with the two Parkhall Road sites (suburban garden and public shrubbery), there are now six known sites for pill woodlice in Clydebank (Fig. 1). This is a remarkable cluster of sites within a small area.

There is a similar density of known sites in the Salisbury Crags/Holyrood Park/Duddingston area of Edinburgh. Not very far from this cluster, on 16/08/2010 I was able to locate three new sites along a short stretch of railway line: at the pedestrian underpass in the University sports ground at Peffermill, (NT280712); on the cycle path beside the railway at Bingham (NT297721); and by the road bridge over the railway at the south-west corner of Jewel Park (NT304721). I am also aware of two railway-side sites in Edinburgh located by the late Bob Saville in May 1994, at (NT219724) and (NT226718).

For reasons of more ready access from my home in Bute, I have spent far more time on a greater number of different dates searching the Gourock-Greenock-Port Glasgow area, including many railway-side sites, and have not yet found any pill woodlice. It is probably significant that with the ground rising steeply to the south, this area is much less sunny than south-facing Clydebank. It is also possible to make comparisons with central Glasgow where I spent much time looking for woodlice in the 1970s (Collis & Collis, 1978) though I did not examine many railway-side sites. I did not find any pill woodlice though I was brought specimens from a now abandoned nursery at Westfield Avenue, Rutherglen, (NS605612).

DISCUSSION

How might the Clydebank cluster of sites be explained? To understand the distribution of a species that is not ubiquitous in an area, we need to consider how it might arrive at new sites, what conditions are needed in order for the arrivals to breed sufficiently well for the colony to survive, and why the colony is able to thrive so as to become numerous enough that it will persist through occasional severe conditions.

For medium-sized flightless invertebrates like pill woodlice, arrival presumably requires it to be carried to a new site, conceivably in flood debris or driftwood, but more likely by inadvertent human transport. In the latter case, there will be a bias toward them arriving in habitats associated with human activity. It is well understood that many species of woodlice are particularly likely to be found in synanthropic sites, but it is not straightforward to disentangle the relative contributions of anthropic factors for arrival and for survival.

One strong possibility for how they might arrive at locations throughout greater Glasgow and Clyde area is through the movement of agricultural and horticultural produce. Prior to the dominance of motorised transport, the movement of fodder and bedding for horses is likely to have been a significant factor in the transport of invertebrates in urban areas. Several species of woodlice, including *Armadillidium vulgare*, are known to flourish in horticultural nurseries. They are still present at two sites in Rothesay where there were once extensive commercial glasshouses (Collis & Collis, 2008), and the species is known from various sites with horticultural connections, including the nursery in Rutherglen, mentioned above, several nursery sites in the Clyde valley (Harding, Collis & Collis, 1980), Culzean Castle gardens and the 'gardens' area of the agricultural college site at Auchincruive (Collis, 2007).

It is well understood that 'hothouse' alien woodlice (Gregory, 2009) are transported with plant material between botanic gardens, and there can be little doubt that this also applies to commonplace plants used in domestic gardens and allotments. Maybe the Parkhall Road colony of pill woodlice became established in this way. It was once common for allotments to be established beside railways, but it is not clear whether this applies to any of the railway side pill woodlice sites in Clydebank. There is also the potential for transport in garden waste discarded onto areas that are regarded as "waste ground". Garden waste can include rubble from paths and rockeries, etc., as well as plant material and soil. It is often seen dumped on railway land, although this was not particularly noticeable at the Clydebank sites. As noted in the introduction, garden waste is also dumped on suburban shorelines, and on rural shorelines too, especially near roadside lay-bys.

There is also a strong probability that woodlice, including *A. vulgare*, are transported in various construction materials including quarried stone and aggregates, especially if the material had some calcareous content, or topsoil (Cawley, 1996). Other possibilities are timber, bricks, concrete fabrications, pipes, and general steelwork, especially if such items have been stored in the open for long enough for them to have become colonised by woodlice. Railway track is normally bedded on hard rock chips, which are typically non-calcareous, but I have information that it is not unusual for the foundations to be formed from softer calcareous rock. Depending on the source location, it is easy to envisage lime-loving invertebrates such as pill woodlice being introduced in such material. In addition to the basic bed of the track, a wide variety of materials are involved with railway-associated structures.

Irrespective of how woodlice got to the railway-side sites, we still need to understand why they have survived and thrived, especially, it seems, in railway-side sites in Clydebank. Even if there is no calcareous rock in the foundation of the trackway, there is likely to be an ample supply of lime in mortared walls and various line-side structures. Pill woodlice are much less tolerant of wet conditions than other woodlice, and the open well-

drained substrate would suit them well, with relatively large interstices allowing this bulky species easy movement through spaces to find microsites that are suitable in a variety of climatic conditions. Clydebank has the added advantage of a sunny south-facing aspect.

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Urban Biodiversity: Successes and Challenges: Urban tern ecology: common terns in Leith Docks

Gemma Jennings, Robert Furness¹, & Derek McGlashan²

¹ Institute of Biodiversity, Animal Health and Comparative Medicine, University of Glasgow, G12 8QQ

² School of Social and Environmental Sciences, University of Dundee, DD1 4HN

E-mail: g.jennings.1@research.gla.ac.uk

The Imperial Dock Lock, a disused lock wall in Leith Docks, Edinburgh, supports the largest common tern (*Sterna hirundo*) colony in Scotland and was designated

as a Special Protection Area (SPA) for the species in 2004. The SPA lies in a continually changing operational port and the port owners are keen to understand more about the terns. Analysis of long-term count data suggests that colonisation of this urban environment occurred as a result of relocation from natural islands in the Firth of Forth over the past few decades, in particular Inchmickery, which was formerly a regional stronghold for the species, but was abandoned possibly due to high numbers of gulls. Field work was performed at the colony during the breeding seasons of 2009 and 2010. Foraging studies showed that terns fed primarily in the Firth of Forth rather than within the docks, and their diet consisted mostly of clupeids, but also sandeels and small gadoids. Predation of chicks by herring gulls (*Larus argentatus*) and lesser black-backed gulls (*L. fuscus*) was observed in both seasons, despite which, high numbers of chicks fledged from the colony. Observations and preliminary experiments on the terns' sensitivity to disturbance at the colony indicated that the birds are tolerant of routine human activities in the docks and that they have become well habituated to breeding in this urban environment. The results of this study combined with continued monitoring will be useful for the conservation of this SPA.

Urban Biodiversity: Successes and Challenges: Human perceptions towards peri-urban deer in Central Scotland

Stephanie Ballantyne

c/o Norman Dandy, Forest Research, Northern Research Station, Midlothian, EH25 9SY

E-mail: stephistheone@hotmail.com

Red deer (*Cervus elaphus*) have been successfully breeding in the Scottish highlands for centuries, and many people have a classic association of herds of deer roaming over the vast expanding Scottish hills. However, today species such as roe deer (*Capreolus capreolus*) are increasingly being seen in and around Scotland's Central Belt, producing a very different human perception of deer than in the Scottish Highlands. Roe deer bring benefits and impacts to peri-urban areas (communities consisting of urban and rural components) within the Central Belt. It is not yet known peoples' perception towards deer in more urbanised communities, and whether they perceive deer to be beneficial to the local environment or a hindrance.

In the UK there is an estimated 316,000 red deer, 300,000 roe deer, 128,000 fallow (*Dama dama*), 128,000 muntjac (*Muntiacus reevesi*) and 26,600 sika (*Cervus nippon*) and 2100 Chinese water deer (*Hydropotes*